

Variable interaction strengths stabilize marine community pattern

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Abstract

High variability in the strength of species interactions is usually considered a source of unstable or unpredictable community patterns. However, recent theoretical work suggests that some types of variance in interaction strength may actually promote stability. Here we provide the first empirical evidence that highly variable, context-dependent species interaction strengths and resilient community patterns can be two sides of the same coin. Field experiments show that a persistent rocky intertidal seascape is remarkably resilient to multiple sources of environmental stochasticity largely because of scale dependent and variable species interaction strengths. Biological interactions exert a stabilizing effect because their intensity varies systematically with changes in both physical sources of mortality of established species, as well as recruitment of new individuals. Strong variation in species interaction strengths with disturbance size and environmental conditions is ubiquitous in nature. Elucidating when this context dependency will be stabilizing is critical to predict community-level responses to anthropogenic disturbances.